Exhibit 2
Supplemental Affidavit of James R. Smallwood
ICC Docket No. 03-0323

Capital Cost System Tool

(CAPCS)

Documentation

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Capital Cost System

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1.0 Introduction

Section 1.0 provides an overview of the Capital Cost System (CAPCS). The purpose of the tool and its output are described, and the methodology used to compute capital costs is covered at a high level.

For more detailed information regarding the model input / output and methodology, see Sections 3 and 4, respectively. Section 2 provides additional background on concepts underlying the Capital Cost factors.

1.1. Purpose of CAPCS

CAPCS is a Microsoft Excel® workbook containing worksheets in which capital cost factors, i.e., book depreciation, cost of money and income taxes, are calculated. The capital cost factors calculated are used in SBC cost studies.

The purpose of CAPCS is to calculate forward-looking capital cost factors used to derive the costs attributable to telephone plant accounts. Forward-looking capital costs are calculated based on (investors') expected future returns. They do not use historical data. A telephone plant account is "a specific element of a chart of accounts used to record, classify and accumulate similar financial transactions resulting from the operations of the entity"[1] as defined in Part 32 - Uniform System of Accounts for Telecommunications Companies.

Capital costs factors are computed for each telephone plant account and several sub-accounts based upon user-provided cost data[2], such as economic plant service lives and salvage values. Capital costs are calculated in cost studies by applying an annual capital cost factor (a ratio of expense to investment) to estimates of the investment in telephone plant. Capital cost factors are values that reflect a time value of money that is averaged over a future planning period. The planning period may be the full life of the plant, as agreed by SBC and regulatory agencies or based on input from external experienced sources which create studies for the telecommunications industry. Capital cost factors are comprised of three components: book depreciation, cost of money and income taxes.

CAPCS is important because it allows the analyst to generate the forward looking capital cost factors in a consistent and accurate manner by using Microsoft Excel®. In addition, this provides individuals the ability to easily follow or track the calculations used to arrive at the capital cost factors. CAPCS may also be used for sensitivity analyses of capital costs factors changing service lives, costs of money and other cost data.

Results of CAPCS are used in retail and wholesale product cost studies to convert investment into annual costs and subsequently into monthly recurring costs. This is done

[1] Plant accounts are defined in the Uniform System of Accounts, Part 32 of the FCC Rules.

[2] Ibidem.

by multiplying the annual investment by the capital cost factor and then dividing the total by the number of months in the year. In a simplified example, if the annual investment for Digital Electronic Switching, account 2212, were $1,200 and the capital cost factor for the same account is 0.20, then the monthly recurring cost would be defined as follows:

$$\text{Annual cost} = \$1{,}200 * 0.20 = \$240 / \text{year}$$

and the monthly recurring costs = $240 / 12 (months per year) = $20.

1.2. CAPCS Overview and Output

CAPCS is a Microsoft Excel® workbook which creates an output as a results of its calculations. Figure 1 below shows a sample output that is contained in CAPCS in the worksheet labeled Results.

SWB Telecommunications, Inc.

Capital Cost System PC Version 1.0

State Name

Cost of Money:	14.00%
Composite Tax Rate:	40.00%
Debt Ratio:	20.00%
Annual Interest Rate:	10.00%

Account Number	Account Name	Book Depreciation	Cost of Money	IncomeTax Expense	Total Capital Costs
2111	Total Land	0.0%	13.0%	7.4%	20.4%
2112	Total Motor Vehicles	12.9%	6.5%	3.7%	23.1%
2115	Garage Work Equipment	10.0%	6.2%	3.5%	19.7%
2114	Tools & Other Work Equipment	10.0%	6.2%	3.5%	19.7%
2121.1	Buildings - Administrative or Administration	2.6%	10.3%	5.9%	18.8%
2122	Furniture	8.3%	6.7%	3.8%	18.8%
2123.1	Office Equipment - Office Support	12.5%	6.2%	3.5%	22.2%
2123.2	Office Equipment - Office Communication	12.5%	6.2%	3.5%	22.2%
2124	General Purpose Computers	20.0%	6.5%	3.7%	30.2%
2212	Digital Electronic Switching	10.0%	6.2%	3.5%	19.7%

Figure 1 - CAPCS Output

1.3. General Description of Methodology

The following sections briefly describe the methodology used to obtain the three components calculated by CAPCS: book depreciation, cost of money and income taxes. For additional details of the methodology of CAPCS please refer to section 4.0.

1.3.1. Book Depreciation

Book depreciation is defined as the annual expense necessary to recover the initial capital investment in telephone plant. The initial investment includes all capitalized investment required to make the plant operational including, where appropriate, vendor equipment, vendor labor and telco engineering & labor. Book depreciation typically is calculated using straight-line[3] depreciation based on the following formula:

$$\text{Book depreciation} = (\text{Initial investment} - \text{Net salvage}) / \text{Service life}$$

where net salvage is the salvage value for the property retired less the cost of removal and the service life is defined the expected life of a unit.

For example, if the initial investment for poles is $1,000, the net salvage value for these is 10% and the service life of poles is 10 years, then:

$$\text{Book depreciation of poles} = (\$1{,}000 - \$100) / 10 = \$90$$

1.3.2. Cost of Money

Cost of money (COM) is comprised of the weighted average of two elements: the cost of debt (COD - to bondholders) and the cost of equity (COE - to shareowners). It represents the return required on capital invested in telephone plant, necessary to satisfy investor cost of money. The cost of debt is the amount of money it costs the company to carry a loan. In other words, how much interest must be paid to other parties for lending money to the firm. The cost of equity represents the amount of money a company must pay its shareholders to ensure the shareholders receive enough earnings for their current and future investments. Also, debt ratio is the ratio of debt capital (long-term bonds) to the total of debt and equity capital. (The term "equity" means "claims against the assets". Therefore, equity capital is the claims against the capital.)[4]

$$\text{COM} = (\text{Initial investment} - \text{accumulated book depreciation}) * \% \text{ COM}$$

where accumulated book depreciation is defined in section 1.3.1 and % COM is calculated as follows:

[3] Straight-line depreciation occurs when the capital repayment schedule takes effect in equal payments throughout the live of the object.

[4] Definition from the book "American Telephone and Telegraph Company Engineering Economy, A manager's guide to economic decision making", Third Version, page 9.

$$\%\,COM = (Cost\ of\ debt * Debt\ ratio) + (Cost\ of\ equity * Equity\ ratio)$$

For example, if the cost of debt is 10%, the cost of equity is 15% and the debt ratio is 20% and equity ratio is 80% (100%-20% debt ratio), then:

$$\%\,COM = (0.10 * 0.20) + (0.15 * 0.80) = 0.02 + 0.12 = 0.14\ (or\ 14\%)$$

1.3.3. Income Taxes

Income taxes represent the amount of federal, state and local taxes a company must pay on the income it generates. In order for a firm to generate the net income required by investors, it will have to increase this income by the tax percentage. In other words,

$$Required\ pre\text{-}tax\ income = Cost\ of\ money\ /\ (1 - Effective\ income\ tax\ rate)\ and$$

$$Income\ taxes = Effective\ income\ tax\ rate * Required\ pre\text{-}tax\ income$$

The effective income tax rate is a composite rate for federal and state income taxes.

For example, if the composite income tax rate is 30% and the cost of money from section 1.3.2 is 14%, then:

$$Required\ pre\text{-}tax\ income = .14\ /\ (1 - 0.30) = 0.20\ (or\ 20\%)\ and$$

$$Income\ taxes = 0.30 * 0.20 = 0.06$$

This means that for each $14 the company wants to create in net income, it must generate $20 worth of gross income. The $6 ($20-$14) will go toward income taxes.

Figure 2 below describes a flow of the process which takes place in CAPCS. Noted on the flow chart is the data required, how this information is processed and the resulting output from the CAPCS run.

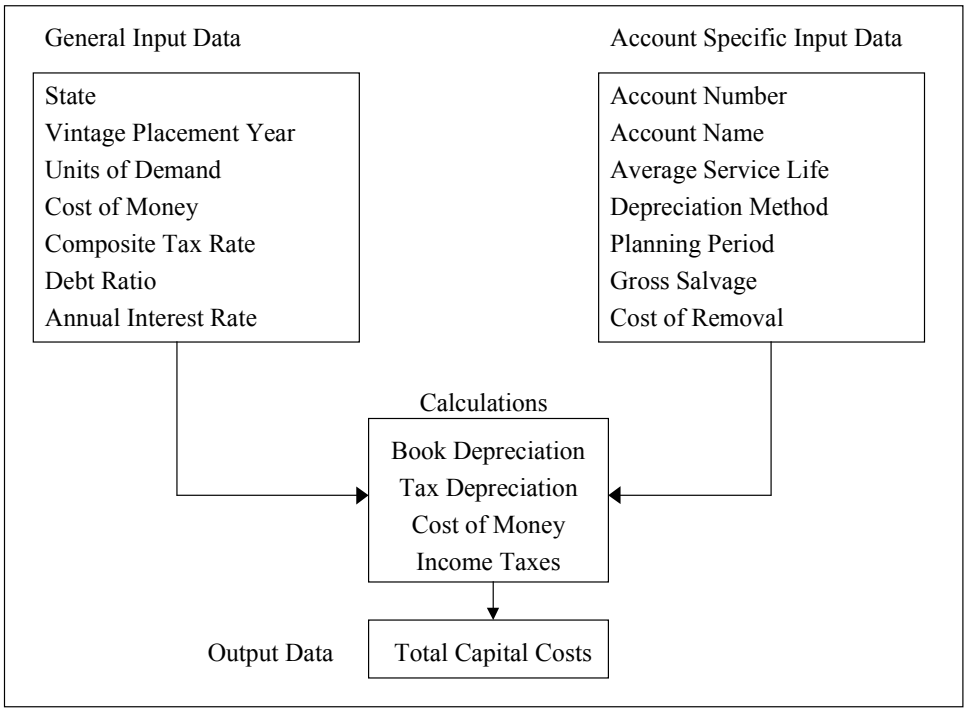

Figure 2 - Flow Diagram for CAPCS data

2.0 Background on Capital Cost Factors

This section provides a basic understanding of capital costs and capital cost factors. Capital costs, which are the sum of book depreciation, cost of money and income tax, are calculated to determine the factor to be applied to an investment in order to recover the debt and equity costs for the company. If these costs are not covered, investors and lenders will not provide cash for future investments and operations of the firm.

2.1. Capital Cost Factor Concepts

This section provides background on the three components of the capital cost factors: book depreciation, cost of money and income tax.

2.1.1. Book Depreciation

Book depreciation is the annual expense of recovering capital invested in telephone plant over the service life of the plant. Expenditures for materials, engineering, labor and other costs of plant construction which are expected to have a service life of more than one year are capitalized. These costs are recovered over the plant's life rather than being expensed in the year in which the plant enters service.

Service life is the number of years a plant is in service. Future service lives are based on estimates of how long plant will be "used and useful." Factors that affect plant service lives include wear, damage, technological obsolescence and others. In regulatory environments there are two main types of lives: 1) Economic, which are defined as the number of years for which a technology will be useful or applicable and 2) Regulatory Prescribed, which are lives ordered by a Public Utility Commission or the Federal Communications Commission (FCC).

As capital invested in telephone plant is recovered, depreciation is accrued in a depreciation reserve. When a plant is retired, the plant and depreciation reserve account are reduced by the value of the initial investment. The plant investment is fully recovered if the annual rate of depreciation is consistent with the service life and salvage realized when the plant is retired.

The initial investment, net salvage and service life[5] of the plant determine book depreciation. Book depreciation typically is calculated using straight-line depreciation based on the following formula:

Book depreciation or depreciation expense = (Initial investment - Net salvage) / Service life
where Net salvage = Gross salvage - Cost of removal

[5] In forward-looking, incremental cost studies, service life also is referred to as *economic life* of the plant.

Figure 3 is an example of the depreciation expense and depreciation reserve for a $1,000 investment with a five-year service life and 10% net salvage. Depreciation expense is $180 per year. This is calculated in the following manner: ($1000 investment - 100 net salvage) /5 years. The depreciation reserve increases from $180 at the end of year one to $720 at the end of year four. In the fifth year, the reserve increases another $180 to $900, and the $100 net salvage is added to the reserve. At the same time, the initial investment is retired, and the reserve returns to $0.

The government has also issued depreciation guidelines for tax purposes. They are based on the Modified Accelerated Cost Recovery System (MACRS).[6] Tax depreciation is calculated in order to determine what is the difference in the depreciation schedule between the book depreciation and the tax depreciation. This difference allows the firm to take advantage of deferred income taxes (and deferred income tax reserve) which means the company can reduce the investor capital, this in turn reduces the cost of money which reduces the total capital costs.[7]

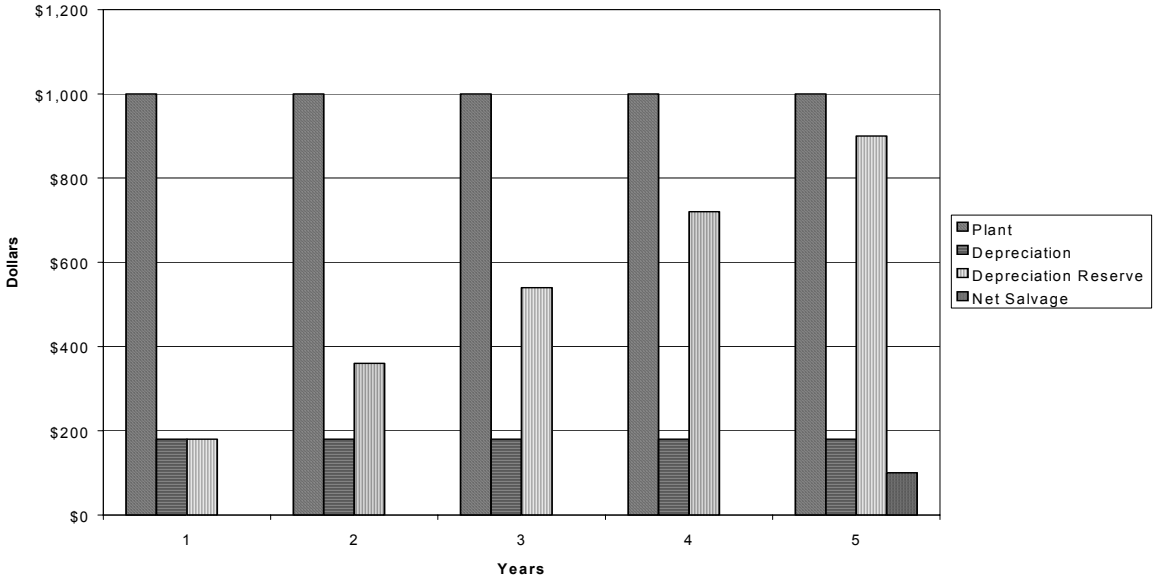

Figure 3 - Depreciation Expense and Reserve for a $1,000 Investment

[6] MACRS (Modified Accelerated Cost Recovery System) is a system for computing and allocating depreciation of property and equipment over one or more periods that are prescribed by the Internal Revenue Code. This method of depreciation was introduced by the Tax Reform Act of 1986 and is mandatory for most depreciable assets placed in service after December 31, 1986.

[7] For further details on tax depreciation or the difference in the depreciation schedule between the book depreciation and the tax depreciation refer to section 4.1.2.

2.1.2. Cost of Money

Each year of the plant's service life, a portion of the initial investment is recovered from revenues. At the same time depreciation accrues to the depreciation reserve. In any year, the difference between the initial investment and the depreciation reserve represents the capital investment remaining to be recovered. This is referred to as net investment. SBC must earn sufficient revenues in excess of operating expenses, including depreciation expense, to provide a return on investor capital (debt and equity). This required return or cost of money is computed by applying a cost of money rate (%) to the net investment.

$$\text{Cost of money (COM)} = \text{COM (\%)} * \text{Net investment}$$

where Net investment = Initial investment - Depreciation reserve

and COM (%) = Debt ratio * COD[8] (%) + Equity ratio * COE[9] (%).

The cost of debt represents the amount of money it costs the company to carry a loan. It is calculated by looking at the current market yield on the firm's debt securities. The cost of equity represents the amount of money a company must pay its shareholders to ensure the shareholders receive enough earnings for their current and future investment. It is obtained by using industry-accepted models. The two main models are the Dividend Growth Model (DGM) and Capital Asset Pricing Model (CAPM). In both models investors expect future returns in form of dividends and stock price appreciation from the purchase of the stock. Since both calculate expected future returns (they do not use historical data), they are forward-looking. However, each goes about it in a different manner. DPM does not consider risk in its calculations. It is defined as follows:

$$DPM = D_1/P_0 + g$$

where D_1 = expected dividend for the coming year, P_0 = current stock price and g = growth rate estimated by analysts' earnings projections.

CAPM, the second model, on the other hand, "is a risk premium methodology which uses a risk premium based upon the difference in returns on a nearly risk free bond and the overall stock market. To estimate the cost of equity for a particular company, it uses the variance of the company's stock price relative to the market as a whole (beta) to adjust the premium. The CAPM formula relating risk and return is"[10]:

$$\text{CAPM} = \text{RF} + (\text{beta} * \text{RP})$$

[8] COD - Cost of debt is defined in section 1.3.2 of this document.

[9] COE - Cost of equity is defined in section 1.3.2 of this document.

[10] From FCC order 89-624

where, CAPM is the cost of equity estimate, RF (risk free) is the current yield on very low risk debt, RP (risk premium) is the analyst's estimate of the difference in return between the return on low risk debt and stocks, and "beta" is an estimate of the difference in risk of the stock for which the cost of equity estimate is being made and the overall risk of stock market investments.

Debt ratio is obtained by dividing the debt capital (long-term bonds) by the sum of debt and equity capital.

Finally, equity is obtained either by using the shareholder's equity on the balance sheet (book value method) or by multiplying the outstanding shares of stock by the current market price of the stock (market value method). This amount is then divided by total capital and the resulting figure is the equity ratio.

Figure 4 shows the cost of money attributable to the investor capital remaining in the plant investment from the example in section 2.1.1. In this example, the cost of money in the first year is assumed to be 10% of $1,000 investment at the beginning of the year, or $100. The cost of money then declines each year as capital is recovered through depreciation expense.[11]

[11] CAPCS uses a "mid-year" timing convention. Investments and capital costs occur throughout the year. However, in order to simplify the process and try to maintain consistency, the mid-year period is used as a equitable timeframe. In the example in Figure 4, an "end of year" convention is used to simplify the illustration.

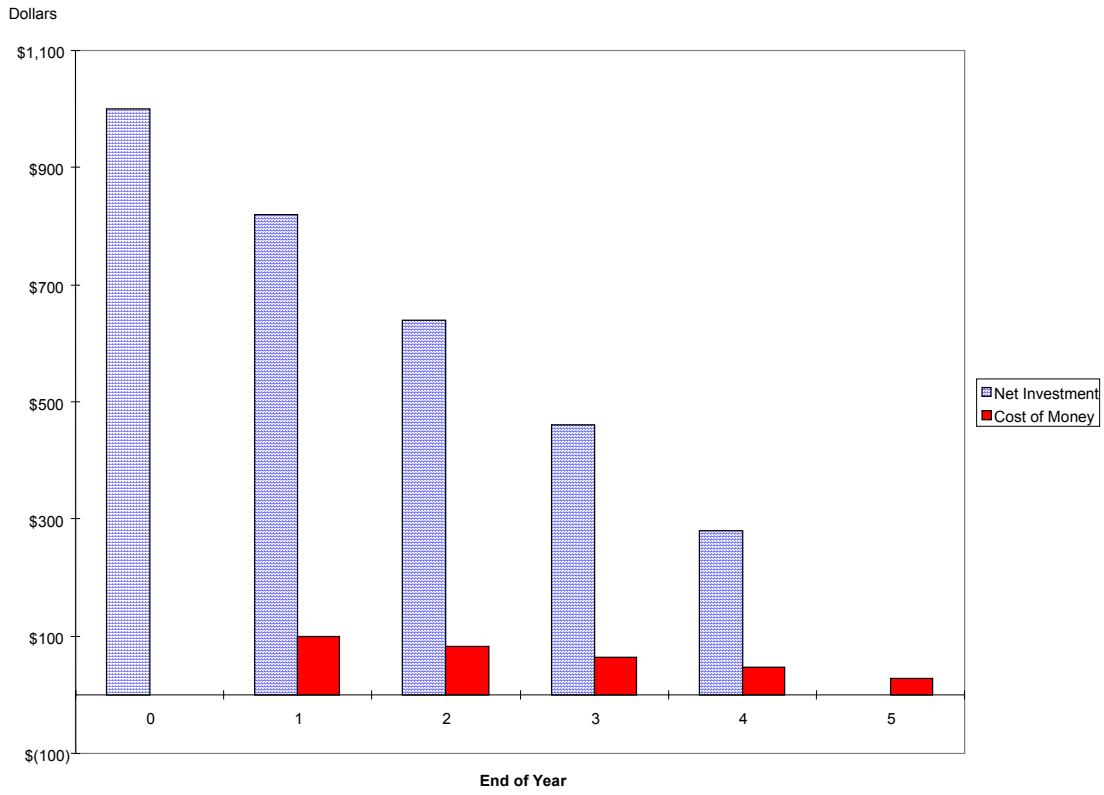

Figure 4 - Cost of Money

2.1.3. Income Taxes

Income taxes represent the amount of federal, state and local taxes the company must pay on the income it generates. In order for a firm to generate the net income required by investors, it will have to increase this income by the tax percentage. Pre-tax income is equal to net income plus income taxes. In other words, for cost of money,

$$\text{Required pre - tax income} = \text{Cost of money} / (1 - \text{Effective income tax rate})$$

For instance, if the composite income tax rate is 30% and the cost of money from section 1.3.2 is 14%, then:

$$\text{Required pre - tax income} = .14 / (1 - 0.30) = 0.20 \text{ (or 20\%)}$$

where the effective income tax rate ($t = t_s + t_f$) is the addition of the federal income tax rate (t_f) and the state income tax rate (t_s).

This means that for each $14 the company wants to create in net income, it must generate $20 worth of gross income. The $6 will go toward income taxes.

3.0 CAPCS Input and Output

This section describes input and output data in CAPCS. Section 3.1 explains the input data in detail while section 3.2 reviews the CAPCS output and its use.

3.1. Input Data

The CAPCS Input Data worksheet contains all user input used in calculating capital costs. This is the only worksheet requiring user input. It is important that only cells designated for input be modified. Other modifications to the worksheet may produce incorrect results and affect the integrity of CAPCS. Input cells contain figures labeled in blue or red. All documentation should be reviewed prior to using the tool.

CAPCS input data is obtained from different groups in the SBC Finance departments - Financial Analysis, Tax Accounting, Corporate Taxes and Depreciation Studies. Once data is received and validated for accuracy, it is entered in the input data worksheet and capital cost factors for use in cost studies are developed. Figure 5 shows the layout of the input data worksheet.

SWB Telecommunications, Inc.
Capital Cost System PC Version 1.0
Input Data
State Name

Vintage Placement Year:	2001
EOY Demand Units:	10,000
Cost of Money:	0.1400
Composite Tax Rate:	0.4000
Debt Ratio:	0.2000
Annual Interest Rate:	0.1000

Get State Defaults | Print Capital Costs Calculation Pages | Create Capital Costs | Print Inputs and Results

Enter 'X' To Compute Capital Costs	Account Number	Account Name	Average Service Life (Years)	Depreciation Method *	Planning Period (Years)	Gross Salvage	Cost of Removal	Class Tax Life
	2111	Land		ND	1			
X	2112	Motor Vehicles	9.0	SL	9.0	9.0%	0.0%	5
X	2115	Garage Work Equipment	10.0	SL	10.0	0.0%	0.0%	5
X	2116	Other Work Equipment	17.0	SL	17.0	0.0%	0.0%	5
X	2121.1	Buildings Dial & Administration	40.0	SL	40.0	9.0%	5.0%	39
X	2121.2	Buildings Other	30.0	SL	30.0	9.0%	5.0%	39
X	2122	Furniture	18.0	SL	18.0	5.0%	5.0%	7
X	2123.1	Office Support	10.0	SL	10.0	0.0%	0.0%	5
X	2123.2	Office Communication Equipment	7.0	SL	7.0	2.0%	2.0%	5
	2124	General Purpose Computers	10.0	SL	10.0	5.0%	3.0%	5
	2212	Digital Electronic Systems	7.0	SL	7.0	8.0%	6.0%	5
	2220	Operator Systems	12.0	SL	12.0	8.0%	8.0%	5
	2231	Radio Systems	7.0	SL	7.0	1.0%	6.0%	5
	2232	Digital Data Systems	9.0	SL	9.0	3.0%	6.0%	5
	2232.1	Digital Circuit Equipment	7.0	SL	7.0	3.0%	3.0%	5
	2232.2	Analog Circuit Equipment	9.0	SL	9.0	1.0%	6.0%	5
	2311	Station Apparatus	7.0	SL	7.0	0.0%	2.0%	7
	2341	Large Private Branch Exchange	9.0	SL	9.0	1.0%	6.0%	7
	2351	Public Telephone Terminal	7.0	SL	7.0	0.0%	0.0%	7
	2362	Other Terminal Equipment	6.0	SL	6.0	1.0%	6.0%	5
	2411	Poles	24.0	SL	24.0	12.0%	89.0%	15
	2421.1	Aerial Cable Metallic	18.0	SL	18.0	20.0%	60.0%	15
	2421.2	Aerial Cable Non-Metallic	25.0	SL	25.0	0.0%	25.0%	15
	2422.1	Underground Cable Metallic	17.0	SL	17.0	15.0%	42.0%	15
	2422.2	Underground Cable Non-Metallic	19.0	SL	19.0	0.0%	20.0%	15
	2423.1	Buried Cable Metallic	20.0	SL	20.0	3.0%	9.0%	15
	2423.2	Buried Cable Non-Metallic	24.0	SL	24.0	0.0%	15.0%	15
	2426.1	Intrabuilding Network Cable Metallic	17.0	SL	17.0	10.0%	30.0%	15
	2426.2	Intrabuilding Network Cable N-Metallic	21.0	SL	21.0	0.0%	15.0%	15
	2441	Underground Conduit	55.0	SL	55.0	0.0%	15.0%	15

* "SL" stands for Square Life, which is a special form of survivor curve that computes straight line depreciation for a single unit of a plant.

Figure 5 - Input Data Sheet Layout - Proprietary Data

3.1.1. General Input Data[12]

The following input data is required to compute capital cost factors and is common for all plant accounts.

[12] The user can run a sensitivity analysis by either varying one or more of the general or account specific input data.

- *State* - The capital cost factor is computed by state. This entry indicates the state for which capital cost factor is computed. During the data input stage, the user selects from a pull down menu a state in which SBC operates.

- *Vintage Placement Year* - This entry is the beginning year of the study and is a reference point for all cost calculations. In developing capital costs, plant is assumed placed at the mid-point of the vintage placement year. All plant retirements are based on the age of plant relative to the vintage placement year. Present worth calculations used to levelize the capital cost factors over a planning period also are relative to this year.

- *EOY Demand Units* - The number of units in service at the end of the year. CAPCS uses a default value of 10,000 for the end of the first year for all plant accounts. This figure is only used as a reference to compute the capital cost factors. 10,000 was selected because it is a figure which works well during computations. The number of units after each consecutive year will vary according to the retirement method used. For square life, which is the method currently used, all units remain in service until the last year.

- *Cost of Money* - Cost of money is the weighted average of the costs of debt and equity capital. The input value is expressed as a percentage and is calculated as,

$$\text{COM} = \text{Debt ratio} * \text{Cost of debt} + \text{Equity ratio} * \text{Cost of equity}$$ [13]

  In forward-looking cost studies, the debt ratio, cost of debt and cost of equity used to compute the cost of money are based on future estimates of SBC's capital structure and costs of capital. This information has been provided by respected experts in economics and with experience in the financial and regulatory environments.

- *Composite Tax Rate* - The effective income tax rate for federal, state and local income taxes. The composite tax rate information is provided by SBC Finance Operations.

- *Debt Ratio* - The ratio of debt capital (long-term bonds) to the total of debt and equity capital (paid-in common stock value, plus retained earnings). This information is provided by the same source as for the cost of money.

Annual Interest Rate - The average interest rate on long-term bonds. This information is provided by the same source as for the cost of money.

3.1.2. Account Specific Input Data

[13] For further information on how debt ratio, cost of debt, equity ratio and cost of equity refer to section 2.1.2.

The following input data is required to compute capital cost factors but varies by plant account.

- *"X" to Compute Capital Costs* - Placing an "X" in the first column of account specific input data indicates capital cost will be computed for the account. If capital costs will be computed for all accounts, an "X" must be placed to the left of every account.

- *Account Number* - Account numbers refer to the plant accounts of the Uniform System of Accounts (USOA). These are the 2000 series of accounts. In some cases, sub-accounts are used to distinguish capital costs for different types of plant within a main plant account, such as metallic versus non-metallic cable and wire facilities. Sub-accounts are indicated by an additional, single digit to the right of the decimal place, such as account 2XXX.1.

- *Account Name* - The account name refers to the type of plant associated with the account number. These should be the same as the account names in the USOA and SBC Operations Accounts Manual.

- *Average Service Life (Years)* is the forward-looking, average life of plant for the particular type of plant being studied. It is the period from when the plant is placed in service until the plant is expected to be removed from service and retired. These lives are used for book purposes. The Average Service Life information is provided by SBC Finance.

- *Depreciation Method* - The depreciation method determines how the asset will depreciate over the average service life. The remaining life method determines how the units are retired from service. The general practice for CAPCS currently is to use the straight line depreciation method with a square life (SL) retirement system.[14] Straight line depreciation is a standard accounting method that is used throughout United States firms when reporting financial figures. The square life retirement system has been adopted by SBC Finance Operations as a standard method for retiring its assets.

- *Planning Period (Years)* - Planning period is the time frame over which capital costs are computed. For example, if the planning period is set at three years, the resulting factors reflect capital costs in the first three years of the plant life. When using the

[14] Square Life (SL) retirement means all units are assumed to retire at the end of the depreciation period. There are several other methods that accelerate depreciation such as Equal Life Group (ELG) and Vintage Group (VG). Both of these systems also use a straight line depreciation method. ELG and VG are not used in CAPCS at this time. In the past, it has been the practice to assume retirements based on survivor curves, which are defined by factors know as c, G & S coefficients. Currently, rather than using this method, CAPCS applies a square life survivor curve.

straight line depreciation method with square life retirement system, the planning period is equal to the average service life years. If the planning period is extended, the book depreciation rate reduces. When the opposite occurs and the planning period is reduced the depreciation rate increases because the full recovery of the assets (less salvage value, if any) must be done in less time. However, as book deprecation changes, the capital costs and capital cost factors will change in the opposite direction.

- *Gross Salvage* - The percentage of initial investment expected to be recovered when plant is retired. Gross salvage is realized from the sale of plant, reimbursement or reuse of the property. The gross salvage information is provided by SBC Finance Operations.

- *Cost of Removal* - The cost incurred in connection with the retirement and disposition of depreciable plant. The cost of removal information is provided by SBC Finance Operations.

- *Class Tax Life* - These are the government issued property depreciation guidelines for tax purposes. They are based on the Modified Accelerated Cost Recovery System. (MACRS).[15]

3.1.3. User Options

The input data worksheet has several function buttons that allow the user to specify options for calculating capital costs and printing results. The selections are the following:

- *Get State Defaults* - This button enables the user to select default values for the general input data for a specific state (cost of money, composite tax rate, etc.).

- *Create Capital Costs* - After selecting the state default values or entering general and account specific input data, this button computes capital costs. As capital costs are calculated for each plant account, new worksheet tabs with the account name are added to the Microsoft Excel® workbook.

- *Print Capital Costs Calculation Pages* - This button is used to print all worksheets, showing detailed calculations for all selected accounts. The user can verify any calculation by selecting cells of the appropriate worksheet.

[15] For additional information about MACRS (Modified Accelerated Cost Recovery System) refer to section 2.1.1.

- *Print Input & Results* - This button enables the user to print the input data and summary of capital costs worksheets. This option can be used to validate input data prior to printing the detailed capital cost calculations.

3.2. CAPCS Outputs

Figure 6 provides an example of the CAPCS output. This worksheet provides capital cost factors for each plant account. The calculations for the figures in each of the four (4) columns is explained in more detail in section 4.0.

SWB Telecommunications, Inc.

Capital Cost System PC Version 1.0

State Name

Cost of Money:	14.00%
Composite Tax Rate:	40.00%
Debt Ratio:	20.00%
Annual Interest Rate:	10.00%

Account Number	Account Name	Book Depreciation	Cost of Money	IncomeTax Expense	Total Capital Costs
2111	Total Land	0.0%	13.0%	7.4%	20.4%
2112	Total Motor Vehicles	12.9%	6.5%	3.7%	23.1%
2115	Garage Work Equipment	10.0%	6.2%	3.5%	19.7%
2114	Tools & Other Work Equipment	10.0%	6.2%	3.5%	19.7%
2121.1	Buildings - Administrative or Administration	2.6%	10.3%	5.9%	18.8%
2122	Furniture	8.3%	6.7%	3.8%	18.8%
2123.1	Office Equipment - Office Support	12.5%	6.2%	3.5%	22.2%
2123.2	Office Equipment - Office Communication	12.5%	6.2%	3.5%	22.2%
2124	General Purpose Computers	20.0%	6.5%	3.7%	30.2%
2212	Digital Electronic Switching	10.0%	6.2%	3.5%	19.7%

Figure 6 - CAPCS Output all accounts

4.0 DESCRIPTION OF CAPCS METHODOLOGY

For each plant account, CAPCS computes book depreciation, the cost of money and income taxes on three separate worksheets. The worksheets are named: Book Depreciation, Tax Depreciation and Cost of Money & Income Taxes.

4.1. Methodology

4.1.1. Book Depreciation

The book depreciation worksheet computes account specific annual book depreciation expenses. Figure 7 shows book depreciation expense calculations for account 2212 Digital ESS

Capital Cost Development Model
Book Depreciation Calculation
State Name
Account 2212: Digital ESS

EOY Units of demand 10000.00 — Book Depreciation

Year	Study Year	Survivor Percentage EOY	Units in Service EOY	Retirements	Age at Retirement	Gross Salvage	Cost of Removal	Full Year Depreciation Rate	Full Year Depreciation Amount	Full Year Depreciation Cumulative Amount	Book Depreciation Mid-Year	Book Depreciation Full-Year
1	1	100.0%	10,000	$ -	1	$ -	$ -	100%	$ -	$ 1,000	$ -	$ 500
2	2	100.0%	10,000	$ -	1	$ -	$ -	100%	$ -	$ 1,000	$ -	$ 1,000
3	3	100.0%	10,000	$ -	2	$ -	$ -	50%	$ -	$ 1,000	$ -	$ 1,000
4	4	100.0%	10,000	$ -	3	$ -	$ -	33%	$ -	$ 1,000	$ -	$ 1,000
5	5	100.0%	10,000	$ -	4	$ -	$ -	25%	$ -	$ 1,000	$ -	$ 1,000
6	6	100.0%	10,000	$ -	5	$ -	$ -	20%	$ -	$ 1,000	$ -	$ 1,000
7	7	100.0%	10,000	$ -	6	$ -	$ -	17%	$ -	$ 1,000	$ -	$ 1,000
8	8	100.0%	10,000	$ -	7	$ -	$ -	14%	$ -	$ 1,000	$ -	$ 1,000
9	9	100.0%	10,000	$ -	8	$ -	$ -	13%	$ -	$ 1,000	$ -	$ 1,000
10	10	100.0%	10,000	$ -	9	$ -	$ -	11%	$ -	$ 1,000	$ -	$ 1,000
11	11	0.0%	0	$ 10,000	10	$ -	$ -	10%	$ 1,000	$ 1,000	$ 500	$ 500
									$ 1,000			$ 10,000

Figure 7 - Book Depreciation Expense Calculation for account 2212 Digital ESS using Square Life

The calculations begin by determining the "Survivor Percentage – EOY[16]" for each study year. The survivor percentage determines what percent of all units continue to remain in service after the specific study year. For the normal square life assumption, the percentage surviving remains 100% until the end of the service life, when it falls to zero, i.e., the plant is retired.

[16] EOY = end of year

The column titled "Units in Service EOY" indicates how many of the units that started at the beginning of the planning period continue to be in service. The units in service are computed as follows:

$$\text{Units in service} = \text{Survivor percentage EOY} * \text{EOY Units of demand}^{17}$$

Since CAPCS uses straight line depreciation with square life (SL) retirement method to compute book depreciation, the age of plant at retirement is important. With the square life retirement method the entire plant is retired at the end of the period. That is why in Figure 7 all units in service remain in place until the end of the period.

"Retirements" are exactly the opposite of "Units in Service EOY". In other words, this column notes how many of the units that started the planning period have been retired. They are calculated in the following manner:

$$\text{Retirements}_{(\text{year X})} = \text{Units in service}_{(\text{year X})} - \text{Units in service}_{(\text{year [X-1]})}$$

Age at retirement is self-explanatory. Gross salvage (GS) and cost of removal (COR) are as defined in section 3.1.2. GS is calculated each year in the following way:

$$\text{GS}_{(\text{year X})} = \text{retirements}_{(\text{year X})} * \text{GS for the specific account from inputs sheet}$$

COR is calculated each year as follows:

$$\text{COR}_{(\text{year X})} = \text{retirements}_{(\text{year X})} * \text{COR for the specific account from inputs sheet}$$

Because CAPCS computes capital costs using the mid-year timing convention, it is necessary to compute half-year values for depreciation expense and to reflect depreciation occurring in the first and second halves of each year. The results are displayed in the last two columns of Figure 7 called "Book Depreciation Mid-Year" and "Book Depreciation Full-Year". For the example presented in Figure 7, book depreciation full-year in the first year is $500 = one-half (½) the annual depreciation. For all remaining years, except for the last, book depreciation is $1,000 each year. The last year the depreciation is $500 (which is the same as the first year) or one-half (½) of a full year.

4.1.2. Tax Depreciation

CAPCS contains the tax depreciation rates allowed by the U. S. Internal Revenue Service (IRS) Modified Accelerated Cost Recovery System (MACRS).[18] Tax depreciation is

[17] Refer to section 3.1.1 for details of EOY Units of demand

[18] For details about MACRS refer to section 2.1.1.

calculated in order to determine what is the difference in the depreciation schedule between the book depreciation[19] and the tax depreciation. This difference allows the firm to take advantage of deferred income taxes (and deferred income tax reserve) which means the company can reduce the investor capital, this in turn reduces the cost of money which reduces the total capital costs. The calculations for tax depreciation are shown in Figure 8 that is at the end of this section.

The first column in figure 8, "Plant in Service BOY" (Beginning of Year), shows the number of units that are in service at the BOY. The second column, "Plant in Service EOY" (End of Year), shows the number of units that are in service at the EOY. The terms "Units in Service[20]" and "Plant in Service" are used interchangeably. The column labeled "Tax Depreciation Rate Current Year" displays the MACRS tax depreciation rate as required by the government. In this example, account 2212, Digital ESS, MACRS depreciation rate has been set for 5 years. The IRS established strict rules as to what the correct number of years are for each particular capital element being depreciated. The next column, "Tax Depreciation Rate Prior Years" is self-explanatory.

To compute tax depreciation each year, the tax depreciation rate is applied to the beginning of year plant in service. Tax depreciation continues until the cumulative amount of the tax depreciation rate reaches 100%. At this point, tax depreciation ceases.[21] The "Tax Depreciation" column is generated in the following manner:

Tax depreciation = Plant in service EOY * Tax depreciation rate current year

Since some units are retired for tax purposes prior to being fully depreciated, CAPCS also determines the remaining tax basis or portion of plant retirements not tax depreciated. This remaining tax basis is deducted from the net salvage to compute the gain. Similar to the book depreciation reserve, CAPCS also computes a cumulative tax depreciation reserve. "Remaining Tax Basis" is calculated by the following formula:

Remaining tax basis = (1- Tax depreciation percentage rate prior years) * Retirements[22]

"Net Salvage Value" (NSV) is defined as:

$$NSV = \text{Gross Salvage (GS)} - \text{Cost of Removal (COR)}$$

The next column, "Gain", is obtained in the following manner:

[19] For calculations of the book depreciation refer to section 4.1.1.

[20] Units of service are defined in section 4.1.1.

[21] For additional information about depreciation and retirement methods refer to section 3.1.2.

[22] This figure comes from the fifth column from the left in Figure 7.

Gain = NSV - Remaining tax basis

And "Tax Depreciation Reserve" is calculated as follows:

Tax depreciation reserve = Tax depreciation + Remaining tax basis - Retirements[23]

The most important figures on the Tax Depreciation worksheet are those in the column "Deferred Tax Normalized". These figures represent the deferred income taxes expected due to the higher tax depreciation relative to book depreciation. The amounts shown in the next to the last column equal the difference in book and tax depreciation times the composite tax rate. Over the life of the plant, the amount of deferred tax is $0, indicating that total tax deductions are the same; only the timing is different. The deferred tax reserve represents the funds available for capital investment from normalized deferred taxes. In section 4.1.3, you will see how the deferred tax reserve reduces net investment, cost of money and income taxes. Column "Deferred Tax Normalized" (DTN) is generated in the following way:

DTN = Composite tax rate[24]*(Tax depreciation-Booked depreciation full year-Gain)[25]

The "Deferred Tax Reserve" (DTR) is the cumulative value of the deferred tax normalized. That is:

$$DTR_{(year\ X)} = DTR_{(year\ [X-1])} + DTN_{(year\ X)}$$

Once again, the importance of calculating the Deferred Tax Reserve is to determine by how much a company can reduce the investor capital, thus reducing the cost of money which in turn reduces the total capital costs.

[23] Ibidem.

[24] For the definition of "Composite Tax Rate" refer to section 3.1.1.

[25] For Booked Depreciation Full Year refer to section 4.1.1.

Capital Cost Development Model
Tax Depreciation Calculation
State Name
Account 2212: Digital ESS

Plant In Service		Tax Depreciation Rate							Deferred Tax	
BOY	EOY	Current Year	Prior Years	Tax Depreciation	Remaining Tax Basis	Net Salvage	Gain	Tax Depreciation Reserve	Normalized	Reserve
$ 10,000	$ 10,000	20.0%	0.0%	$ 2,000	$ -	$ -	$ -	$ 2,000	$ 600	$ 600
$ 10,000	$ 10,000	32.0%	20.0%	$ 3,200	$ -	$ -	$ -	$ 5,200	$ 880	$ 1,480
$ 10,000	$ 10,000	19.2%	52.0%	$ 1,920	$ -	$ -	$ -	$ 7,120	$ 368	$ 1,848
$ 10,000	$ 10,000	11.5%	71.2%	$ 1,152	$ -	$ -	$ -	$ 8,272	$ 61	$ 1,909
$ 10,000	$ 10,000	11.5%	82.7%	$ 1,152	$ -	$ -	$ -	$ 9,424	$ 61	$ 1,970
$ 10,000	$ 10,000	5.8%	94.2%	$ 576	$ -	$ -	$ -	$ 10,000	$ (170)	$ 1,800
$ 10,000	$ 10,000		100.0%	$ -	$ -	$ -	$ -	$ 10,000	$ (400)	$ 1,400
$ 10,000	$ 10,000		100.0%	$ -	$ -	$ -	$ -	$ 10,000	$ (400)	$ 1,000
$ 10,000	$ 10,000		100.0%	$ -	$ -	$ -	$ -	$ 10,000	$ (400)	$ 600
$ 10,000	$ 10,000		100.0%	$ -	$ -	$ -	$ -	$ 10,000	$ (400)	$ 200
$ 10,000	$ 10,000		100.0%	$ -	$ 0	$ -	$ (0)	$ -	$ (200)	$ 0
									$ -	

Figure 8 - Taxed Depreciation Expense Calculation for account 2212 Digital ESS

4.1.3. Cost of Money and Income Taxes

The cost of money and income taxes are computed in the next worksheet, which is shown in Figure 9. Again, the mid-year convention requires that the cost of money and income taxes be computed in the first (period 1) and second (period 2) halves of the year.

The Book Depreciation Reserve (BDR) amounts shown in the first (labeled "Book Depreciation Reserve period 1") and second (labeled "Book Depreciation Reserve period 2") columns reflect cumulative book depreciation. They are defined as:

$$\text{BDR period 1}_{(\text{year X})} = \text{BDR} + \text{BDFY} - \text{RetirementsRetirements} + \text{GS} - \text{COR}$$ [26]

$$\text{BDR period 2}_{(\text{year X})} = \text{BDR period 1}_{(\text{year}[X+1])}$$

For calculating BDR period 1, all items listed on the right of the "=" sign are from year X-1.

[26] BDFY = Booked Depreciation Full Year. Refer to Figure 7, section 4.1.1.

GS = Gross Salvage. Refer to Figure 7, section 4.1.1.

COR = Cost or Removal. Refer to Figure 7, section 4.1.1.

Net investment (NI) is computed for the first and second halves or periods of each year based on plant in service and the beginning and end of each year, less the book depreciation reserve (BDR). That is:

$$NI_{(period\,1)} = \text{Plant in service BOY} - BDR_{(period\,1)} \text{ and}$$
$$NI_{(period\,2)} = \text{Plant in service EOY} - BDR_{(period\,2)}$$

where plant in service BOY and plant in service EOY are defined in section 4.1.2, Figure 8.

The deferred tax reserve then is subtracted from net investment to determine the amount of investor capital (IC) remaining in the plant in service. This is done by the following formula:

$$IC_{(period\,1)} = NI_{(period\,1)} - \text{Deferred tax reserve}_{(period\,1)} \text{ and}$$
$$IC_{(period\,2)} = NI_{(period\,2)} - \text{Deferred tax reserve}_{(period\,2)}$$

where deferred tax reserve comes from section 4.1.2, Figure 8.

The next six columns, "Debt Interest" (DI) and "Cost of Money" (COM) are computed on a half-year basis (period 1 and period 2) by multiplying one-half the user-specified annual interest rate[27] and cost of money times the investor capital in the first and second halves of each year.[28]

"Effective Taxable Income" is the difference between the cost of money and debt interest.

"Income Tax Expense" (ITE) is defined as follows:

ITE = Effective taxable income * [Composite tax rate/(1 - Composite tax rate)]

The composite tax rate is defined in section 3.1.1. The above formula is derived from the fact that:

Income tax (IT) = Taxable income (T) * Tax rate (t)

where taxable income is defined as revenue - depreciation - debt interest and revenue is defined as book depreciation + return (to investors after taxes) + income taxes.[29] After all the calculations and substitutions are made the results reflects exactly the same formula as shown for ITE.

[27] Annual interest rate is defined in section 3.1.1.

[28] The debt interest and cost of money amounts in the second half of the year also are present worthed for one-half year to place them at the same point in time as debt interest and cost of money in the first half.

[29] Definition from the book "American Telephone and Telegraph Company Engineering Economy, A manager's guide to economic decision making", Third Version, page 176.

All the above calculations lead to the value being searched in this worksheet which is the total (Annual) capital costs (TCC) that are defined as:

TCC = Book depreciation full-year + Total cost of money + ITE

where book depreciation full-year comes from Figure 7 in section 4.1.1. Total cost of money and ITE are defined earlier in this section.

Capital Cost Development Model
Cost of Money and Income Taxes Calculation
State Name
Account 2212: Digital ESS

Book Depreciation Reserve		Net Investment		Defered Tax Reserve		Investor Capital		Debt Interest			Cost of Money			Effective Taxable Income	Income Tax Expense	Total Capital Cost
Period 1	Period 2	Period 1	Period 2	Period 1	Period 2	Period 1	Period 2	Period 1	Period 2	Total	Period 1	Period 2	Total			
$ -	$ 500	$ -	$ 9,500	$ -	$ 600	$ -	$ 8,900	$ -	$ 81	$ 81	$ -	$ 564	$ 564	$ 483	$ 322	$ 1,386
$ 500	$ 1,500	$ 9,500	$ 8,500	$ 600	$ 1,480	$ 8,900	$ 7,020	$ 87	$ 64	$ 151	$ 603	$ 445	$ 1,048	$ 897	$ 598	$ 2,646
$ 1,500	$ 2,500	$ 8,500	$ 7,500	$ 1,480	$ 1,848	$ 7,020	$ 5,652	$ 69	$ 52	$ 120	$ 475	$ 358	$ 834	$ 714	$ 476	$ 2,309
$ 2,500	$ 3,500	$ 7,500	$ 6,500	$ 1,848	$ 1,909	$ 5,652	$ 4,591	$ 55	$ 42	$ 97	$ 383	$ 291	$ 674	$ 577	$ 384	$ 2,058
$ 3,500	$ 4,500	$ 6,500	$ 5,500	$ 1,909	$ 1,970	$ 4,591	$ 3,530	$ 45	$ 32	$ 77	$ 311	$ 224	$ 535	$ 458	$ 305	$ 1,840
$ 4,500	$ 5,500	$ 5,500	$ 4,500	$ 1,970	$ 1,800	$ 3,530	$ 2,700	$ 34	$ 25	$ 59	$ 239	$ 171	$ 410	$ 351	$ 234	$ 1,644
$ 5,500	$ 6,500	$ 4,500	$ 3,500	$ 1,800	$ 1,400	$ 2,700	$ 2,100	$ 26	$ 19	$ 46	$ 183	$ 133	$ 316	$ 270	$ 180	$ 1,496
$ 6,500	$ 7,500	$ 3,500	$ 2,500	$ 1,400	$ 1,000	$ 2,100	$ 1,500	$ 20	$ 14	$ 34	$ 142	$ 95	$ 237	$ 203	$ 135	$ 1,373
$ 7,500	$ 8,500	$ 2,500	$ 1,500	$ 1,000	$ 600	$ 1,500	$ 900	$ 15	$ 8	$ 23	$ 102	$ 57	$ 159	$ 136	$ 91	$ 1,249
$ 8,500	$ 9,500	$ 1,500	$ 500	$ 600	$ 200	$ 900	$ 300	$ 9	$ 3	$ 12	$ 61	$ 19	$ 80	$ 68	$ 46	$ 1,126
$ 9,500	$ -	$ 500	$ -	$ 200	$ 0	$ 300	$ (0)	$ 3	$ (0)	$ 3	$ 20	$ (0)	$ 20	$ 17	$ 12	$ 532

Figure 9 - Cost of Money and Income Tax Calculations for account 2212 Digital ESS

4.1.4. Total Capital Costs

The summary of capital costs shows the annual average plant in service, book depreciation, cost of money, income taxes and total capital costs for each year of the planning period. Each of these values is brought to the beginning of the placement year using present worth factors based on the user-specified cost of money.[30] Capital cost factors then are computed by dividing the present worth values of each capital cost by the present worth of plant investment. This results in levelized capital cost factors over the planning period.

All of the data comes together in Figure 10. The first column in this table is the "Present Worth of Future Amounts". The present value (PV) is the value in today's dollars of a payment or stream of payments expected to be received in the future. PV is always the value today. Its formula is:

[30] The number of periods used in computing present worth factors reflects CAPCS's mid-year timing convention. Therefore, the number of periods for plant in service or capital costs in year 2 is 1.5 years (year one, plus half of year two).

$$PV = 1 / (1+ COM\ \%)^{(Year\ in\ future\ -\ 0.5)}$$

The next column "Average Plant in Service" (APS) refers to the number of units which are still in service. This is determined as follows:

$$APS_{(year\ X)} = (BDFY_{[Year\ X]} + BDFY_{[Year\ X\ -\ 1]}) / 2$$

where BDFY is book depreciation full year that comes from section 4.1.1, Figure 7.

The next five columns contain values that have been "Present Worthed". In other words their future values have been brought to today's dollars. The first of these columns is present worth of "Average Plant in Service" or PW_{APS} which is calculated this way:

$$PW_{APS} = PV * APS\ (as\ defined\ above)$$

The next column, the present worth of "Book Depreciation" (PW_{BD}), represents the value of the book depreciation for the life of the items in today's dollars. It is the first component (of three) of the total capital costs factor and is defined by:

$$PW_{BD} = PV * BDFY$$

The following column, "Present Worth of Cost of Money" (PW_{COM}) represents the value of the cost of money for the life of the items in today's dollars. It is the second (of three) component of the total capital costs factor and is calculated as follows:

$$PW_{COM} = PV * total\ cost\ or\ money$$

where total cost or money comes from Figure 9, section 4.1.3.

The third and last component of the total capital costs factor and is the "Present Worth of Income Tax Expenses (PW_{ITE}). It represents the value of the income tax expenses for the life of the items in today's dollars in the following manner:

$$PW_{ITE} = PV * total\ income\ tax\ expense$$

where total income tax expense comes from Figure 9, section 4.1.3.

These three factors are all added along the rows to create the total capital costs, the last of the columns in Figure 10. Also, each of the individual present worth columns is added to a total for all years. In each of the three cases the present worth is divided by the PW_{APS} to generate the capital cost factors. So, the capital cost factor for book depreciation

$$CC_{FBD} = \sum PW_{BD} / \sum PW_{APS}$$

(CC_{FBD}) is calculated as:

In the same way the capital cost factor for cost of money (CCF_{COM}) is:

$$CCF_{COM} = \sum PW_{COM} / \sum PW_{APS}$$

And the capital cost factor for income tax expense (CCF_{ITE}) is:

$$CCF_{ITE} = \sum PW_{ITE} / \sum PW_{APS}$$

The three figures CC_{FBD}, CCF_{COM} and CCF_{ITE} are the same as the figures listed Figure 6 of section 3.2 under outputs for account 2212, Digital Electronic Switching. The final objective of CAPCS is to generate these numbers. The above pages have described how this is done.

Capital Cost Development Model
Summary of Capital Costs
Present Value Cost Calculation
State Name
Account 2212: Digital ESS

Present Worth of Future Amount	Average Plant in Service	Present Worth of: Average Plant in Service	Book Depreciation	Cost of Money	Income Tax Expense	Total Capital Costs
0.9366	$ 5,000	$ 4,683	$ 468	$ 529	$ 302	$ 1,298
0.8216	$ 10,000	$ 8,216	$ 822	$ 861	$ 491	$ 2,174
0.7207	$ 10,000	$ 7,207	$ 721	$ 601	$ 343	$ 1,664
0.6322	$ 10,000	$ 6,322	$ 632	$ 426	$ 243	$ 1,301
0.5545	$ 10,000	$ 5,545	$ 555	$ 297	$ 169	$ 1,020
0.4864	$ 10,000	$ 4,864	$ 486	$ 200	$ 114	$ 800
0.4267	$ 10,000	$ 4,267	$ 427	$ 135	$ 77	$ 638
0.3743	$ 10,000	$ 3,743	$ 374	$ 89	$ 51	$ 514
0.3283	$ 10,000	$ 3,283	$ 328	$ 52	$ 30	$ 410
0.2880	$ 10,000	$ 2,880	$ 288	$ 23	$ 13	$ 324
0.2526	$ 5,000	$ 1,263	$ 126	$ 5	$ 3	$ 134
Present Worths		$ 52,273	$ 5,227	$ 3,216	$ 1,835	$ 10,279
Capital Cost Factors		**100.0%**	**10.0%**	**6.2%**	**3.5%**	**19.7%**

Figure 10 - Total Capital Cost for account 2212 Digital ESS

Appendix - Electronic Copies of CAPCS

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